ADDITIONAL NOTES ON THE GENUS *AVICENNIA*. XIV

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AVICENNIA L.

Additional bibliography: A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; Peters, Naturwiss. Reise Mossamb. 6 (1): Bot. 266. 1861; Byrne, Atoll Res. Bull. 240: 30, 32, & 191, fig. 10. 1980; Mold., Phytologia 46: 193--199. 1980; Sullivan, Bot. Soc. Am. Misc. Ser. Publ. 158: 113. 1980; Teas, Bot. Soc. Am. Misc. Ser. Publ. 158: 115. 1980.

The *Riba & Gómez Pompa 326* distributed as *Avicennia* sp. is not avicenniaceous nor verbenaceous.

AVICENNIA ELLIPTICA Holm

Additional bibliography: Mold., Phytologia 40: 408. 1978.

Recent collectors describe this species as a tree, 18 m. tall, with slightly fragrant flowers, and have found it in anthesis in October. Araujo & Maciel refer to it as frequent in the mangrove formation in Espirito Santo and the corollas are said to have been "white" on their no. 3330.

Additional citations: BRAZIL: Espirito Santo: Araujo & Maciel 3330 [Herb. FEEMA 15513] (Ld).

AVICENNIA EUCALYPTIFOLIA Zipp.

Additional bibliography: H. Hallier, Meded. Rijks Herb. Leid. 37: 87--88. 1918; Walsh in Reimold & Queen, Ecol. Haloph. 59. 1974; V. J. Chapm., Mangr. Veg. 21, 24, 173, 174, 390, & 436, fig. 11. 1976; Mold., Phytologia 40: 408. 1978.

AVICENNIA GERMINANS (L.) L.

Additional & emended synonymy: *Avicennia tomentosa* var. *campechensis* Humb. & Bonpl. apud Steud., Nom. Bot. Phan., ed. 1, 96. 1821. *Avicenna nitida* Jacq. ex Mold., Suppl. List Inv. Names [1], in syn. 1941; Lescure, Cahiers O.R.S.T.O.M. Biol. 12: 362. 1977. *Avicenia nitida* Jacq., in herb.

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N. L. Britton, Fl. Bermuda 320. 1918; E. D. Merr., Sp. Blanc. 335--336. 1918; Pellett, Am. Honey Pl., ed. 1, 38 & 39, fig. 22 & 23 (1920) and ed. 2, fig. 23 & 24. 1923; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 608. 1927; Stapf, Ind. Lond. 1: 370. 1929; V. J. Chapm., Proc. Linn. Soc. Lond. 158: 2--6. 1947; Perez-Arbelaez, Pl. Util. Colomb., ed. 1, 442. 1947;H. N. & A. L. Mold., Pl. Life 2: 42, 51, 56, 68, 72, & 80. 1948; Metcalfe & Chalk, Anat. Dicot. 2: [1028], 1030, & 1038, fig. 2460. 1950; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 323, 525, & 528, fig. 139. 1957; Angely, Bot. Aplic. Farm. 267 & 302. 1958; J. F. Morton, Wild Pl. Surviv., ed. 1, 11 & 71. 1962; Russell, Ann. Ent. Soc. Am. 56: 152. 1963; Van Zinderen Bakker, Palaeoecol. Afr. Surr. Isl. 1: 75. 1966; D. Powell, Bull. Inst. Jam. Sci. 15 (2): 417, 421, & 429. 1973; Duncan in Reimold & Queen, Ecol. Haloph. 43. 1974; McMillan in Reimold & Queen, Ecol. Haloph. 380, 385, 387, & 389. 1974; J. F. Morton, Wild Pl. Surviv., ed. 2, 11 & 75. 1974; Walsh in Reimold & Queen, Ecol. Haloph. 59, 82, 83, 89, 98, 101, 103, 106, 107, 116, 125, 127, 129, 147, & 172. 1974; García-Barriga, Fl. Med. Colomb. 2: 496. 1975; V. J. Chapm., Coast. Veg., ed. 2, 218--222, 224--229, & 231--233, fig. 8.2--8.5. 1976; V. J. Chapm., Mangr. Veg. 2, 7, 18, 19, 21, 24, 29, 30, 34--48, 51, 53--68, 75, 86, 191, 192, 209, 212, 213, 220--222, 228, 229, 233, 239--241, 243, 245, 246, 252, 257--260, 265, 268, 273--276, 281, 282, 288, 289, 295, 299, 300, 303--314, 316, 341--345, 369, 372, 378, 379, 389--393, 405, 406, 414, 420, 423, & 425, fig. 11, 12, 16, 17, 19--21, 23, 24, [28], [29], 33--41, 43, 45, 145--148, 152, 157, 169, 169b, 176a, 178, 197, 201, 203--207, 209--213 (5--7), 214--218, 254--260 (1--3), & 294. 1976; Gunn & Dennis, World Guide Trop. Drift Seeds opp. 49 & 78--79. 1976; Little, Rare Trop. Trees S. Fla. [U. S. Dept. Agr. Conserv. Res. Rep. 20]: 19. 1976; Woodbury & Little, U. S. Dept. Agr. For. Serv. Res. Paper ITF-19: 8, 9, & 23. 1976; Batson, Gen. East. Pl. 146. 1977; Lescure, CahiersO.R.S.T.O.M. Biol. 12: 361--376, fig. 1 (2) & 2 (1, 3, & 4). 1977; Lugo & Zucca, Trop. Ecol. 18: 149--161, fig. 1--5. 1977; Pool, Snedaker, & Lugo, Biotropica 9: 200--202, fig. 3--8. 1977; Poppeton, Shuey, & Sweet, Fla. Scient. 40: 384. 1977; Richardson, Fla. Scient. 40: 297, 303, & 319. 1977; Terrell, U. S. Dept. Agr. Agric. Handb. 505: 17 & 160. 1977; Carlton in Pritchard, Rare Endang. Biota Fla. 5: 167--168, fig. 89. 1978; Coultas, Biol. Abstr. 66: 2412--2413. 1978; Coultas, Journ. Soil Sci. Soc. Am. 42: 111--115. 1978; Fournet, Fl. Ilustr. Phan. Guad. Mart. 1408--1409, fig. 671. 1978; Hartman in Pritchard, Rare Endang. Biota Fla. 5: xxix. 1978; Little, Atlas U. S. Trees 5 [U. S. Dept. Agr. For. Serv. Misc. Publ. 1361]: 12, map 168. 1978;Lugo & Zucca, Biol. Abstr. 66: 5620. 1978; Mold., Phytologia 40: 408--410. 1978; Mound & Halsey, Whitefly World 223. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 44. 1978; Perkins & Payne, Guide Poison. Pl. Fla. [Fla. Coop. Ext. Serv. Inst. Food Agric. Sci. Circ. 441:] [13], [66], [76], & [77]. 1978; Rabinowitz, Biol. Abstr. 63: 3222 & 6272. 1978; Rabinowitz, Biotropica 10: 47--57, fig. 4, 5, & 10. 1978; Rabinowitz, Journ. Ecol. 66: 45--52. 1978; Schnetter, Beitr. Biol. Pfl. 54: [13]--28, fig. 1--13. 1978; Ward in Pritchard, Rare Endang. Biola Fla. 5: vi & 171. 1978; Zuberer & Silver, Appl. En-

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Additional & emended illustrations: Nutt., N. Am. Silva 2: pl. 105. 1846; Metcalfe & Chalk, Anat. Dicot. 2: [1028], fig. 246 G. 1950; Alain in León & Alain, Fl. Cuba, imp. 1, 323, fig. 139. 1957; J. F. Morton, Wild Pl. Surviv., ed. 2, 11. 1974; V. J. Chapm., Coast. Veg., ed. 2, 219--222, fig. 8.2--8.5. 1976; V. J. Chapm., Mangr. Veg. fig. 16, 169b, 176 (a, g, k, & 1), 178, 197, 201, 203--207, 209--213 (5--7), 214--218, 254--260 (1--3), & 294. 1976; Gunn & Dennis, World Guide Trop. Drift Seeds opp. 49. 1976; Batson, Gen. East. Pl. 147. 1977; Lescure, Cahiers O.R.S.T. O.M. Biol. 12: [363], fig. 1 (2) & 2 (1, 3, & 4). 1977; Pool, Snedaker, & Lugo, Biotropica 9: 201 & 202, fig. 3--8. 1977; Rabinowitz, Biotropica 10: 49, fig. 5. 1978.

Rabinowitz (1978) discusses in detail the characteristics of dispersal and establishment for the water-borne propagules of *Avicennia* as compared to those of *Laguncularia, Rhizophora,* and *Pelliciera,* including period and pattern of flotation, period of obligate dispersal, time required to root firmly, longevity, and vigor. The dispersal properties correlate with the spatial distribution of adult trees within the swamp. Genera, like *Avicennia* whose adults (at least in Florida) are found on higher ground on the landward edge of the intertidal zone, have small propagules that require a period of freedom from tidal inundation of approximately 5 days in order to establish themselves firmly in the substrate. Gunn & Dennis (1976) describe and illustrate the disseminules of the present species as they occur washed ashore on tropical beaches. They state that the "Unfolded cotyledons are said to serve as miniature boats, but this does not explain how germinating and non-germinating fruits float. It would appear that buoyancy is due to buoyant seedling or fruit tissues. The buoyancy lasts about a year and nearly 100 percent of seedlings washed ashore are viable. "Unlike most disseminules, the black mangrove usually drifts as seedlings, not as seeds or fruits. The fruit acts as a surrogate seed coat, because the seed coat is absent. The embryo germinates while the fruit is still attached to the parent tree. When the seedling drops, it may be self-planted in the mud below the parent tree, or be carried into the ocean by the tide....Black mangrove was introduced into west Africa by man. While the red mangrove *(Rhizophora mangle)* and its relatives have rugged appearing drift seedlings, black mangrove seedlings appear to be so delicate that they would not be able to withstand the vicissitudes of drifting or being stranded." [to be continued]